REMARKS

The foregoing amendments are made to more thoroughly define the subject matter applicant regards as his invention and in light of a telephone interview conducted between Examiner Kara Negrelli and the undersigned on June 17, 2010. Applicant wishes to express his appreciation for the many helpful courtesies extended by the examiner during the interview.

At the interview, proposed claims essentially the same as new claim 71 were discussed. A copy of these proposed claims is attached. As summarized in the Interview Summary issued on June 22, 2010, the examiner indicated that these proposed claims were probably patentable over the references then in the case for the reasons indicated in the Interview Summary. However, the examiner reserved the right to update her prior art search to see if any more pertinent references could be found.

In a telephone conversation conducted on or about August 25, 2010, the examiner advised that these proposed claims were not patentable over certain new prior art references she had found. These new references are US 2003/0018095 to Agarwal, which in Paragraph 21 appears to indicate that sulfonyl hydrazide blowing agents can be used to produce epoxy foams. In addition, in Paragraph 23, this reference also appears to indicate that a variety of different chemicals, including "amines," can be included in the reaction system "to lower the temperature at which release of gas from the blowing agent takes place." Also relevant are U.S. 5,998, 508 to Corley and U.S. 5,854,312 to Klippstein, which appear to describe epoxy resins cured with waterborne amines. As best understood, it is the examiner's position that the new claims proposed in the telephone interview would not be patentable, since it would have been obvious from Agarwal that, if Agarwal's sulfonyl hydrazide blowing agents were included in Corley's or Klippstein's amine-cured epoxy resin systems, they would decompose for foam formation at lower temperatures than their normal decomposition temperatures due to the presence of the amine curing agents in these systems.

In order to speed prosecution, it was agreed during that telephone conversation that this Amendment need only focus on these new references, since the newly proposed claims discussed in the telephone interview distinguished over the previously-cited references for the reasons set

forth in the Interview Summary. To this end, an Information Disclosure Statement formally citing these new references is being concurrently filed with this Amendment.

In view of these developments, applicant has cancelled all of the claims previously in the case and replaced them with a new set of claims which generally correspond to proposed new claim 71 discussed in the above noted telephone interview, except that new claim 71 in this amendment (1) expressly indicates that the foam is formed at a temperature of about 1° C to about 60° C as set forth in Paragraph [0018] of the specification and (2) component (b) of claim 71 has been broadened to include the waterborne polyamide-amine curing agent that was inadvertently omitted from claim 71 discussed at the interview.

Additional claims have also been provided to claim some of the non-elected subject matter in order that the current claim set claims all of the subject matter presented in the original application. No attempt has been made to determine which of these claims is drawn to non-elected subject matter, since (1) the underlying rational of the restriction requirement remains unclear at least as it relates to these new claims and (2) applicant believes all claimed subject matter relates to a single common invention since all claimed subject matter is patentable for the same reason as further discussed below. However, applicant confirms his prior election.

Turning now to substance, also attached to this Amendment is another copy of product literature describing one of the blowing agents used in the working examples of this application, Celogen OT. A copy of this product literature was previously sent to the examiner, along with the proposed claims mentioned above, for the telephone interview. On page 2, this product literature indicates that the normal decomposition temperature of this blowing agent (153° C - 160° C) can be lowered by the addition of certain chemical activators such as triethanol amine. On page 3, this product literature describes this effect in more detail, indicating that (1) triethanol amine is a "very strong" activator for Celogen OT and (2) triethanol amine will lower the normal decomposition temperature of this blowing agent down to as low as 125° C. In Applicant's view, persons of ordinary skill in the art would understand from this disclosure that, while the strongest activators such as triethanol amine might be able to lower the normal decomposition temperature of Celogen OT and its sulfonyl hydrazide analogs somewhat, the maximum amount of this temperature lowering is only about 28° C to 35° C [(153° C-125° C) to (160° C-125° C)].

Now, the newly cited Agarwal reference does indeed teach that "amines" can be used to lower the decomposition temperatures of sulfonyl hydrazide chemical blowing agents, as the examiner has indicated. However, this reference does not suggest that these decomposition temperatures can be lowered by substantially more than the 28° C to 35° C range taught in the Celogen OT product literature. Accordingly, it would not be obvious that the inventive foaming systems could be made to form foams at temperatures of 60° C or less, as now specified in all claims. And Agarwal clearly fails to suggest that the inventive foaming system could be made to form foams at temperatures of 40° C or less, as now specified in claims 73, 91, 96, 99, 102 and 105, or 15° C to 30° C, as now specified in claims 74, 97, 100, 103 and 106.

Therefore the inventive process as now claimed, as well as the foaming systems used to practice this process as well as the product foams produced thereby, are unobvious and patentable over these newly cited references.

If any fee is due with this amendment, please charge our deposit account no. 03-0172.

Respectfully submitted,

/JEMiller/

Date: September 10, 2010

John E. Miller, Reg. No. 26,206
Customer No. 24024
(216) 622-8679
jemiller@calfee.com

PROPOSED CLAIM FOR TELEPHONE INTERVIEW

71. (new) A method for forming a polymer foam, the method comprising combining

(a) a polymer resin capable of reacting with a curing agent to form the solid polymer binder of the polymer foam,

(b) a curing agent for the liquid polymer resin comprising a waterborne polyamine or polyamide, and

(c) a chemical blowing agent comprising at least one sulfonyl hydrazide, and

allowing the mixture so made to form the polymer foam at a temperature below the activation temperature of the blowing agent.

72. (new) The method of claim 71, wherein the mixture reacts to form a foam at a temperature of about 1° C to about 60° C. **[Abstract]**

73. (new) The method of claim 72, wherein the mixture reacts to form a foam at a temperature of about 1° C to about 40° C. **[¶0018]**

72. (new) The method of claim 71, wherein the mixture reacts to form a foam at a temperature of about 15° C to about 30° C. **[¶0018]**

LION COPOLYMER, LLC

5955 Scenic Highway • Baton Rouge, LA 70805-2044
800 / 535-9960 • www.lioncopolymer.com

Activators for Celogen® OT

Celogen OT (OBSH) is an efficient, non discoloring, non-staining, non-toxic and odorless nitrogen type foaming agent. It has proved itself commercially to be very effective for use in natural and synthetic expanded rubber rubber, as well as expanded plastics.

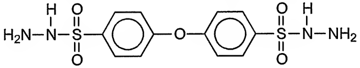
Celogen OT is a white crystalline powder which decomposes smoothly when rubber mixes or solvent solutions of it are heated. Under such conditions, it evolves about 120 cm^3 of noncondensible gas per gram, over 95% of which is nitrogen. The decomposition residue is a nontoxic polymeric material. Decomposition is a function of time and temperature and may start slowly as low as 130 °C (266 °F). The range for most rapid and efficient gas evolution is from 150-160 °C (302-320 °F). This is sufficiently high to allow material to be milled directly into rubber.

Celogen OT is generally applicable to all types of chemically foamed natural and synthetic expanded cellular rubber. It tends to produce a fine uniform cell structure which may be open or closed cell according to the technique involved. It may be used as the sole foaming agent or as an auxiliary with sodium bicarbonate to even out the irregularities in performance of the latter.

Promotors – such as glycols, urea and acids – are not required with Celogen OT to release the nitrogen gas during the normal curing temperature range. For special foaming applications at relatively low curing temperatures, alkanolamines will aid in lowering the decomposition point. Oxidizing agents such as peroxides also cause decomposition of Celogen OT at low temperature.

Celogen® OT Structure and Properties

p,p'-oxybis (benzenesulfonyl hydrazide)



Properties

Form:	fine white crystalline powder
Specific Gravity:	1.55
Decomposition Point:	153-160 °C (307-320 °F)
Gas Yield:	125 cc/gram
Decomposition Gases:	N_2 (95%), H_2O (5%)

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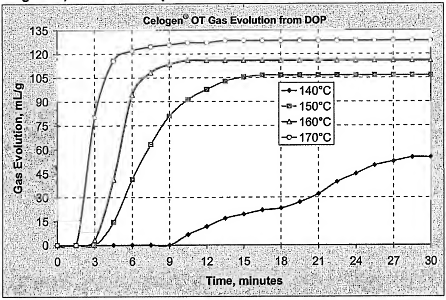
Temperature Range of Celogen® OT

Celogen OT is generally used to expand rubber and plastics in the temperature range of 135-170 °C (275-338 °F). Note the rate of gas evolution becomes slow below 150 °C (302 °F).

Figure 1, Effect of Temperature on Gas Evolution of Celogen OT



Activation of Celogen OT

The decomposition point of Celogen OT may be lowered by the addition of ingredients like BIK-OT urea and triethanol amine (TEA). Also, the impact of compounding ingredients used for other purposes should also be recognized.

Gas Evolution Data

The effect of activation on the decomposition of Celogen OT (OBSH), may be shown by gas evolution data obtained at various concentrations and temperatures.

The following activation classification system is suggested for Celogen OT.

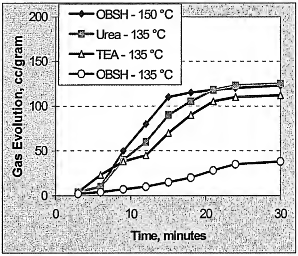
Activation Classification System for Celogen OT (based on 10 parts of activator per 100 parts OBSH)		
Very strong	>70 cc/gram	in 15 minutes at 135 °C
	also estimated over 100 cc/gram	in 9 minutes at 150 °C
Strong	30 to 70 cc/gram	in 15 minutes at 135 °C
Moderate	<30 cc/gram and	in 15 minutes at 135 °C
	>75 cc/gram	in 9 minutes at 150 °C
Weak	50 to 75 cc/gram	in 9 minutes at 150 °C

Very Strong Activators of Celogen OT

Urea (BIK-OT) and triethanolamine (TEA) are very strong activators for Celogen OT (OBSH). They are quite effective even at temperatures as low as 125 °C (257 °F). Fast decomposition occurs at 135 °C (275 °F) where the rate approaches that of OBSH at 150 °C (302 °F) as shown in Figure 1.

Celogen OT is used extensively in certain applications like automotive space fillers and printing blankets where slow, low temperature cures are desirable.

Figure 2, Effect of Activators on Gas Evolution of Celogen® OT



Strong Activators of Celogen OT

Diphenyl guanidine (DPG) accelerator is also a strong activator of Celogen OT. Thus, the compounder should recognize the dual function of this accelerator.

Moderate Activators of Celogen OT

Calcium oxide, calcium stearate, stearic acid and some vinyl stabilizers, such as the cadmium and lead types (e.g. Dythal), are moderate activators of Celogen OT, see Table 1. Gas evolution rates at 135 °C (257 °F) and 150 °C (302 °F) are shown.

Table 1, Moderate Activators of Celogen OT

Time, Minutes at Temperature	Gas Evolution, cm^3/gram No Activator	Calcium Oxide	Stearic Acid	Calcium Stearate	Cd Heat Stabilizer	Dythal
135 °C - 15	19	4	16	18	11	20
30	44	17	46	41	36	51
150 °C - 3	3	4	3	5	6	4
6	12	20	21	32	20	25
9	42	79	91	83	79	75
12	81	102	107	107	110	100
15	111	113	111	113	116	108
18	116	116	---	116	118	112

The moderate activators have very little effect on Celogen OT in 30 minutes at 135 °C (275 °F). The gas evolution rates are tripled at 150 °C (302 °F) during the 6 to 9 minute period. Calcium oxide actually tends to retard the gas evolution of Celogen OT at 135 °C.

Weak Activators of Celogen OT

This group consists of organic acids like adipic, benzoic, citric and salicylic acids, plus lead and zinc stearates, see Table 2.

Table 2, Weak Activators of Celogen OT

Time, Minutes at Temperature	Gas Evolution, cm^3/gram					
	No Activator	Adipic Acid	Benzoic Acid	Citric Acid	Salicylic Acid	Lead Stearate
135 °C - 15	19	16	9	18	12	20
30	44	35	37	39	39	55
150 °C - 3	3	5	3	5	2	2
6	12	20	19	29	15	18
9	42	62	71	64	67	66
12	81	92	95	89	98	93
15	111	99	104	94	103	103
18	116	101	107	101	104	109

Ingredients like zinc oxide, phthalic anhydride (e.g. Retarder ESEN) and the zinc type vinyl stabilizers like (e.g. Mark 552G) show very little activation of Celogen OT.

Vinyl stabilizers should be selected very carefully to obtain the desired effects in systems containing Celogen OT. The cadmium and lead types, although used with less frequency today, are moderate activators of Celogen OT. The zinc stabilizers seem to have very little effect on Celogen OT.

Activator Blends with Celogen OT

The effect of blends of activators on the gas evolution rate of Celogen OT at 135 °C (275 °F) is shown in Table 3. A blend of very strong activators, urea and TEA (Blend E) further increases the gas evolution rate of Celogen OT. Addition of the dessicant calcium oxide with urea or TEA (Blends F and G) seems to reduce the gas yield.

Table 3, Activator Blends for Celogen OT

	Gas Evolution, cm³/gram						
Blend	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Celogen OT	100	100	100	100	100	100	100
Urea	---	10	---	---	10	10	---
TEA	---	---	10	---	10	---	10
CaO	---	---	---	10	---	10	10
Time at 135 °C, Minutes							
3	4	1	3	--	13	4	5
6	4	12	22	1	34	23	22
9	7	36	33	2	64	43	34
12	12	62	48	3	79	68	47
15	19	93	70	4	90	87	63
18	25	110	95	7	98	99	88
24	36	124	113	14	102	107	105
30	44	126	116	17	104	108	112

Blends of Celogen AZ and Celogen OT are used to provide controlled gas evolution as the temperature is raised from 125 to 150 to 106 °C. In the early phases of the development of crosslinks or cure, the Celogen OT starts to decompose. The Celogen AZ provides the final expansion phase as the temperature is increased. Thus, the activator should be selected based on its impact on these two chemical foaming agents, as shown in Table 4.

Table 4, Activators for Celogen OT and Celogen AZ

Activator	Celogen OT	Celogen AZ
Adipic Acid	Weak	Weak
Calcium Oxide	Weak	Weak
Stearic Acid	Moderate	Nil
TEA	Very Strong	Moderate
Zinc Oxide	Nil	Very Strong
Zinc Stearate	Weak	Very Strong
Urea (BIK-OT)	Very Strong	Strong

Many of the activators are bifunctional in a formulation, i.e. zinc oxide, zinc stearate, calcium oxide, TEA and urea. These ingredients also activate the accelerators used in the curing system. Thus, the compounder must be aware of the impact of these accelerators on the foaming agents to avoid blow-cure problems.

When Celogen OT and Celogen AZ are used together, urea should be avoided.